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Abstract: This work is part of the project Machine Understanding for interactive StorytElling (MUSE), which introduces a new way of text understanding by “bringing text to life” through 3D interactive storytelling. The paper focuses on the mapping from the unstructured information found in knowledge representation of written stories, to a context-bounded and structured knowledge or meaning representation, suitable to be processed by a virtual reality module. That process yields an exponential explosion of instance combinations, since each sentence may contain a set of high-level concepts, each one giving place to a set of low-level instance candidates. The selection of the best combination of instances is a structured classification problem that yields a combinatorial optimization problem, which is computationally highly demanding and which is approached by a special genetic algorithm (GA) formulation, able to exploit the conditional independence among variables, while improving the parallel scalability. On the other hand, a large number of feasible combinations are usually related to a large uncertainty, which means high entropy, in the information theory sense, i.e. a high demand of information. Therefore, the automatic rating of the resulting set of instance combinations, i.e. the suitable text interpretations, demands an exhaustive exploitation of the state-of-the-art resources in natural language processing to feed the system with evidences to be fused by the proposed framework. In this sense, a statistical framework able to reason with uncertainty, integrating supervision, i.e. training with annotated examples, and evidence from external sources was adopted. The effectiveness of the proposed algorithm has been evaluated in detail on the story "The Day Tuk Became a Hunter" and is being currently evaluated on benchmark datasets.